REMARKS

Claims 1-18 remain pending in the application. Claims 1, 7, and 13 have been amended for clarification.

Claims 1-2, 5-8, 11-14, 17-18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Krishna (U.S Patent 6,136,111).

As for **Claim 1, 7 and 13**, Office Action stated that Krishna discloses the recited limitations as follows:

'a computer-based method for determining the optimum join sequence for processing a query having a plurality of tables from a relational database stored in an electronic storage device having a database management system' *as the process of a join order optimization for a multiple join queries in a relational database management system* [See col. 1, lines 5-6], the method comprising the steps of:

'a first pass for determining an optimum join sequence for joining the plurality of tables from the query' *as the calculating an optimal order for join of tables in a multiple join query* [See Fig. 1, col. 3, lines 24-26, 31-32];

'a second pass for using the optimum join sequence for creating a lowest cost access path plan for processing the query' *as a join order selected among other possible join orders, wherein the selected join order has the smallest sigma (i.e., lowest cost) and the optimal access path to perform the join query* [See Fig. 2, col. 3, lines 44-50].

As shown in claims 1, 7 and 13, the present invention is directed to a system and a computer-based method for determining the optimum join sequence for processing a query having a plurality of tables from a relational database stored in an electronic storage device having a database management system, the method comprising the steps of:

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(a) a first pass for determining an optimum join sequence for joining the plurality of tables from the query; and

(b) a second pass for using the optimum join sequence for creating a lowest cost access path plan for processing the query.

Claim 2 is directed to the method according to claim 1, wherein the first pass performing successive steps until creation of a simulated composite table having all tables from the query, wherein each said step:

creating a set of miniplans for simulating all possible joins of a predetermined subset of the query tables; and

using a cost model calculations for estimating and saving the least expensive join from said set of joins, thereby determining the optimum join sequence.

Thus, the present invention uses a two pass process for creating a lowest cost access path plan for processing the query. As can be see throughout the Specification (starting on page 6) and claims 2, 8 and 14, the present invention creates a set of miniplans for simulating all possible joins.

Independent claims 1, 7 and 13 are hereby amended to clarify that the present invention uses simulation in determination of the optimum join sequence, used for the access path plan for processing the query.

Krishna reference, however, does not teach use of a two pass process for creating a lowest cost access path plan, does not use simulation, and does not create miniplans. It is true that Krishna reference uses a lowest cost, but Krishna reference calculates a sigma metric as a cardinality of each join by summing table cardinality estimates, preferably determined by a graph or retrieving a pre-computed value, as can be seen in col. 3, li. 46, li. 59-67.

Krishna reference thus teaches away from the present invention because it is directed to a calculations of table cardinality whereas the present invention creates a set of miniplans for simulating all possible joins.

Therefore, Krishna reference clearly does not teach the features of the present invention, recited in the claims, as amended, and throughout the Specification, which are not shown in the Krishna reference. Cited reference does not show any features of the present invention, operating in the same way and for the same purpose. Thus, the reference is from a different art field.

To establish prima facie case of anticipation of a claimed invention, the standard for determining novelty under 35 USC 102 was been set forth by the courts *In re Bartleb*, 300 F.2d 942, 133 USPQ 204 (CCPA 1962), and *Hupp v. Siroflex of America Inc.*, 122 F.3d 1456, 43 USPQ2d 1887 (Fed. Cir. 1997), which states that the reference must be identical in all material aspects.

MPEP Sec. 2131, under the title TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM, states that "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Therefore, it is clear that the standard for determining novelty under 35 USC 102 to establish prima facie case of anticipation has not been met for the claimed invention, because the cited reference does not have any and all elements of independent claims, as amended, is from a different field, has different components, works in a different mode of use and produces different results. Thus, independent claims 1, 7, and 13 (as amended) and all claims dependent upon them in the present invention recite novel structure and therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

As for **Claims 2, 8 and 14**, Office Action stated that Krishna teaches 'wherein the first pass performing successive steps until creation of a simulated composite table having all tables from the query' *as a joining of a plurality of tables R, S, and T from the query* [See col. 3, lines 31-32]. *There are two possible join orders for the tables R, S, and T. The first (1) possible join order is join tables R and S, then join the result with table T, the second (2) possible join order is join tables S and T, then join the result with table R* [See col. 3, lines 33-35], 'wherein each said step:

creating a set of miniplans for simulating all possible joins of a predetermined subset of the query tables' *as after joining the two possible join orders, the calculation of the total query for the join order (1) is 80(20+60) and the join order (2) is 560(500+60) are created* [See col. 3, lines 35-41]; and

'using a cost model calculations for estimating and saving the least expensive join from said set of joins, thereby determining the optimum join sequence' *as the cost estimate calculations for the join order (1) is 80 and the join order (2) is 560. Thus, the join order (1) is indicated the least expensive join order from the set of join orders* [see col. 3, lines 52-55].

Cited Italic quotes from the Krishna reference do not even mention first pass, performing successive steps, creation of a simulated composite table, creation of miniplans for simulating all possible joins, etc. Cited Italic quotes show how many tupples are created when a join is performed in different ways. They neither show teachings of the present invention nor the reference, just give a justification for join ordering. This is clearly seen in Col. 3, li. 30-43 which start with "Consider" and end with "the choice of join order can be significant".

Office Action fails to quote, however, the teachings of Krishna shown in col. 3, li. 44-67, as argued by the Applicant above, which clearly show that Krishna reference does not teach use of a two pass process for creating a lowest cost access path plan, does not use simulation, and does not create miniplans. It is true that Krishna reference uses a lowest cost, but Krishna reference calculates sigma metric as a cardinality of each join by summing table cardinality estimates,

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preferably determined by a graph or retrieving a pre-computed value, as can be seen in col. 3, li. 46, li. 59-67.

Therefore, the reference cannot be used to reject these claims. Thus, dependent claims 2, 8, and 14 and all claims dependent upon them in the present invention recite novel structure and therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

As for **Claims 5, 11 and 17**, Office Action stated that Krishna teaches 'wherein the second pass performing successive steps until creation of a simulated composite table having all tables from the query, wherein each said step being performed in the optimum join sequence' *as if the join orders remain to be examined, the process repeats for the next possible join order. A join order with the smallest value is used to perform the join query* [See col. 4, lines 4-7].

Office Action failed to cite properly col. 4, lines 4-7 of Krishna, which clearly states verbatim: *A join order with the smallest value* **Of Sigma** *is used to perform the join query*. This clearly shows that Krishna reference does not teach use of a two pass process for creating a lowest cost access path plan, does not use simulation, and does not create miniplans, but that Krishna reference calculates sigma metric as a cardinality of each join by summing table cardinality estimates, preferably determined by a graph or retrieving a pre-computed value, as can be seen in col. 3, li. 46, li. 59-67.

Further, Office Action failed to cite fully the definition of a process which *repeats for the next possible join order. The process* is described in col. 3, li. 46, li. 59-67 of Krishna as: calculation of sigma metric as a cardinality of each join by summing table cardinality estimates, preferably determined by a graph or retrieving a pre-computed value, which is not the method of the present invention. Moreover, nowhere does Krishna reference even mention a second pass, or a first pass. Further, Krishna reference does not even mention a creation of a simulated composite table.

Therefore, the reference cannot be used to reject these claims. Thus, dependent claims 5, 11, and 17 and all claims dependent upon them in the present invention recite novel structure and

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therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

As per **claim 6, 12 and 18** Office Action stated that Krishna teaches 'wherein the query being a SQL query as *an SQL query* [See col. 4, lines 38-40].

Cited section, starting at col. 4, lines 38-40, only shows an exemplary SQL query to be Considered as an example (col. 4, li. 42).

Therefore, the reference cannot be used to reject these claims. Thus, dependent claims 6, 12, and 18 and all claims dependent upon them in the present invention recite novel structure and therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

Applicant notices with gratitude that the Office Action held that **claims 3-4, 9-10, 15 and 16** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant has rewritten independent claims 1, 7 and 13, for clarification, and claims 3-4, 9-10, 15 and 16 should now be allowable.

Applicant notices with gratitude that the Office Action held that Krishna fails to teach a combination of elements including wherein the first pass for each said miniplan storing a used table index, sorting data, and for each said least expensive join storing names of joined tables, and possible row orderings, as recited in dependent claims 3, 9 and 15.

This confirms the Applicant's argument regarding the invalidity of 102 rejection of independent and dependent claims of the present invention, as shown above, because Krishna reference fails

to teach use of the first and second pass, miniplans, and storing data for the least expensive join in the first pass, to be used in the second pass of the present invention.

Therefore, the Office Action itself admits that the Krishna reference cannot be used to reject these and independent claims of the present invention. Thus, independent claims 1, 7, and 13, as amended, and all claims dependent upon them in the present invention, including claims 3-4, 9-10, 15 and 16, recite novel structure and therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

Therefore, it is clear that the standard for determining novelty under 35 USC 102 to establish prima facie case of anticipation has not been met for the claimed invention, because the cited reference does not have any and all elements of independent claims, is from a completely different field, has different components, works in a different mode of use and produces different results. Thus, independent claims 1, 7, and 13, as amended, and all claims dependent upon them in the present invention recite novel structure and therefore distinguish over the cited prior art, Krishna, and are not anticipated by it under 35 U.S.C. 102(b).

It was shown above that the cited reference cannot be used to invalidate the claims of the present invention and, thus, a prima facie case of obviousness has also not been established under 35 U.S.C. Sec. 103(a) for claims 1-18 of the present invention.
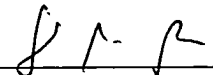
The prior art made of record and not relied upon is considered but found to be even less relevant than Krishna reference.

Therefore, all submitted claims are allowable over the cited reference and their reconsideration is respectfully requested. In view of the above, it is submitted that this application is now in good order for allowance, which applicant respectfully solicits. Should matters remain which the Examiner believes could be resolved in a telephone interview, the Examiner is kindly requested to telephone the Applicant's undersigned attorney. No additional fee is required in connection with this communication since the Amendment is mailed within three months from the Office Action and the number of claims is not extending the original number of claims. However, any

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underpayment is authorized to be charged to Deposit Account Number **09-0460** in the name of IBM Corporation.

Respectfully submitted,

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